DOCUMENT RESUME

ED 137 787 CS 003 355

AUTHOR Olson, Jerry L.
TITLE CATTS (Computer Assisted Teacher Training System) Technical Configuration and Application to Research on Reading.
PUB DATE Apr 77
NOTE 21p.; Paper presented at the Annual Meeting of the American Educational Research Association (New York, New York, April 1977)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS *Classroom Observation Techniques; Computer Assisted Instruction; *Data Processing; Elementary Secondary Education; Interaction Process Analysis; Reading Instruction; *Reading Processes; *Reading Research; *Teacher Behavior; *Teacher Education
IDENTIFIERS Computer Assisted Teacher Training System

ABSTRACT

The computer-assisted teacher training system (CATTS) has been developed to provide a versatile technical system for the real-time collection, feedback, and analysis of observation-coding system data applied to the investigation of interactive behaviors and environments found in teacher behavior research in reading. CATTS technical innovations permit direct entry of observation data during the teaching process, instantaneous visual feedback into the teaching environment, delayed printed feedback summaries; and an indexed data storage and retrieval system. The application of CATTS real-time data processing capabilities to teacher behavior research provides an additional tool in the investigation of the reading process. (Author)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

ED137747

CATTS TECHNICAL CONFIGURATION AND APPLICATION TO RESEARCH ON READING[1]

JERRY L. OLSON

Center for Innovation in Teaching the Handicapped

Indiana University

ABSTRACT

The Computer-Assisted Teacher Training System (CATTS) has been developed to provide a versatile technical system for the real-time collection, feedback, and analysis of observation-coding system data applied to the investigation of interactive behaviors and environments found in teacher behavior research in reading. CATTS technical innovations permit direct entry of observation data during the teaching process, instantaneous visual feedback into the teaching environment, delayed printed feedback summaries, and an indexed data storage and retrieval system. The application of CATTS real-time data processing capabilities to teacher behavior research provides an additional tool in the investigation of the reading process.

Paper for presentation at AERA Annual Meeting, New York, April 7, 1977.

[1]The writing of this paper, and the CATTS development activities described herein, were supported by a grant from the U.S. Office of Education, Bureau of Education for the Handicapped, Division of Research, to the Center for Innovation in Teaching the Handicapped (CITH), Indiana University.

CS 003355

This paper is a brief report on the technical configuration and application of the Computer-Assisted Teacher Training System (CATTS) to research on the reading process being conducted at the Center for Innovation in Teaching the Handicapped (CITH). CATTS research and development activities at CITH have been directed toward combining computer technology with systematic classroom observation and feedback techniques for the realization of a cost-effective Computer-Assisted Teacher Training System (Semmel, 1972, 1975; Semmel, Olson, & Weiske, 1972 The application of CATTS focuses upon improving trainee interaction skills by employing various feedback techniques from information gathered through systematic observation of the real-time classroom teacher-learner process. CATTS was initially conceptualized as a closed-loop cybernetic system capable of providing continuous-instantaneous and/or delayed feedback of relevant teacher-learner interaction data to a trainee in the classroom in order to modify behavior in accordance with predetermined training objectives (Semmel, 1968). Further documentation on research and development activities at CITH in teacher training and observation/feedback techniques employing CATTS methodology will be available in a comprehensive report under project director Melvyn I. Semmel (in preparation).

Objectives of CATTS Technology

The purpose behind the development of the Computer-Assisted Teacher Training System is to provide a cost-effective technical facility for real-time observation-coding system data collection, feedback, and analysis. This purpose is achieved through the development of an

automated system which simplifies data collection techniques for observers, generates real-time and delayed data summary feedback reports to project participants, reduces the complexity of large data-base manipulation requirements for summary analyses, and provides an indexed storage and retrieval system for raw data. Each innovation of CATTS has been developed with the goal of providing a flexible and simplified technical system for maximum application in teacher behavior research employing observation-coding system methods. This flexibility allows researchers to alter data collection and feedback parameters quickly without being required to wait for additional technical development time.

Reason for Technical Developments

Employing real-time computer technology for collection, analysis, and feedback of systematic observation data provides many advantages over traditional paper and pencil methods. By automating the data process for an observer, CATTS eliminates the manual tedium and reduces the time and effort required to record, summarize, and report classroom interaction data. Instead of requiring observers to write category numbers onto tally sheets during pre-set time intervals, CATTS permits immediate entry of category data without regard to time interval restrictions whenever codable behavior is discriminated in the teaching situation. CATTS accomplishes this by automatically calculating time intervals between each of the sequential categories upon entry by the observer. The advantage of automated data collection is that due to the computer's ability to assign time values between the sequential observations during data collection, accuracy of the orthogonal time

components associated with the various observed events during the teaching process is assured.

CATTS also provides for the application of real-time instantaneous visual feedback information back into the classroom during the teaching process. This innovation permits researchers to investigate feedback effects unavailable in conventional hand-coded methods. In addition, printed summary feedback is available immediately after a teaching session due to the data being already on file which replaces methods for hand analysis or hand data transfer for computer analysis.

Computerizing the data process also offers an automated data storage and retrieval system for quick identification of files. Files may be quickly searched and sorted for submission to data analysis and summary procedures soon after the data has been collected with a minimum of time delay. Total automation of the data flow from collection to analysis also reduces errors which may occur in any manual transfer process.

Physical Configuration of CATTS

The physical configuration of CATTS is visualized as consisting of three interdependent stations: Teaching Station, Observation-Coding Station, and Analysis-Encoding Station. Figure 1 is a diagram of the CATTS station configuration.

The CATTS Teaching Stations consist of classrooms which accommodate up to two closed circuit television feedback displays. The TV feedback monitors are placed so that the teacher can visually access the feedback information when required during teaching with a minimum of classroom

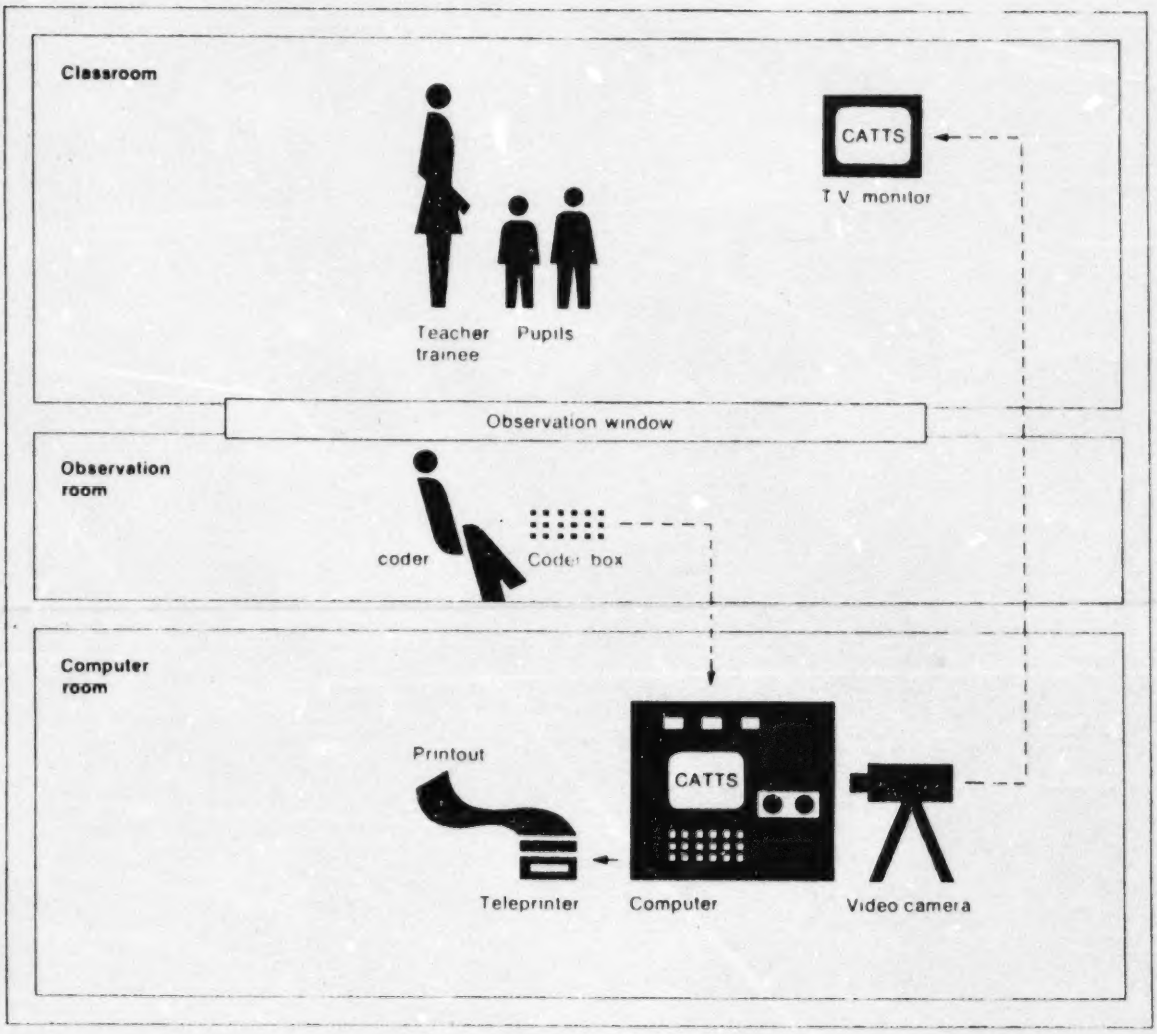

Figure 1. CATTS station configuration at CITH.

disruption. These TV feedback display monitors are controlled directly by the computer.

The Observation-Coding Stations provide the link between the events occurring in the classroom and the computer analysis of these events. Visual observation of the classrooms take place within observation rooms adjoining the classrooms. The methods of direct data input employed by CATTS can be either a directly connected coding box device or a remote TOUCH-TONE telephone connection. Figure 2 illustrates a hand held coding box used by an observer in the Observation-Coding Station. CATTS is capable of accepting up to 12 simultaneous real-time data input sources from up to 12 different classrooms with up to 12 different observation systems being employed. This method allows real-time data collection for the instantaneous video feedback application. A portable data recorder such as the DATAMYTE permits data collection from remote locations without a direct connection to the computer. Data transfer from DATAMYTE units may be performed at any time and do not require real-time data processing. Printed summary feedback from non real-time sessions is then available for feedback applications immediately after upon completion of data transfer.

The Analysis-Encoding Station contains a PDP-12 digital computer and associated computing hardware required for the on-line processing of pushbutton-coded data which is gathered and transmitted from Observation-Coding Stations. In addition to processing the incoming data, the computer system is configured to control TV scope display devices used in the Teaching Stations and provides for the hard copy summary printouts, storage, and transfer of data to the campus remote computer system for

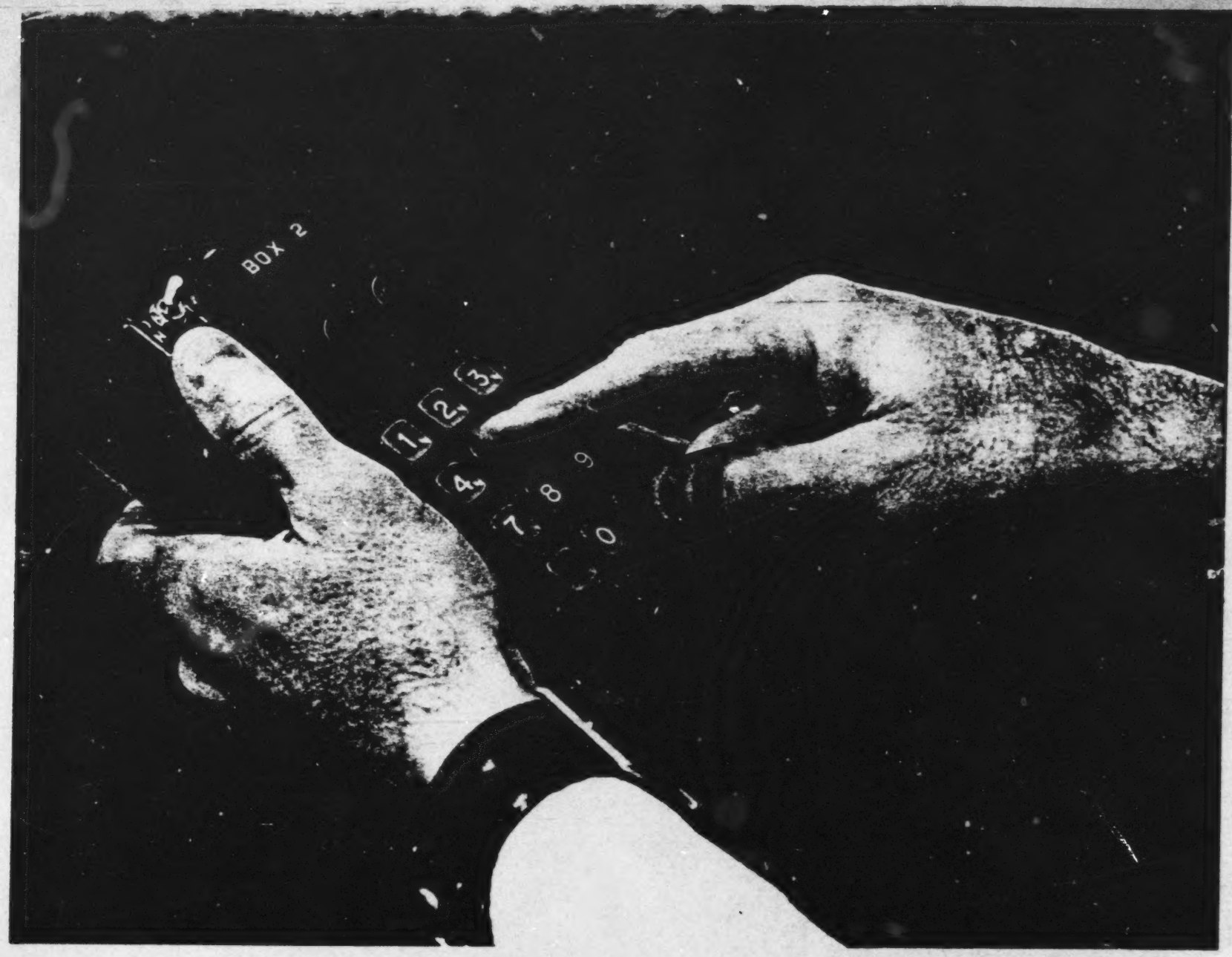

Figure 2. Hand held coding box for observation data entry.

further analysis. Figure 3 illustrates the method employed to transfer feedback displays back into the classroom. The display is generated by the computer onto a Cathode Ray Tube (CRT) display unit and a closed circuit television camera transmits the image to the TV feedback monitor located in the Teaching Station. It is at this station that the computer system operator initiates the computer program options available in CATTS. The teleprinter console, through software program control, permits the operator to select specific CATTS options that satisfy project data collection and feedback requirements.

Upon completion of the observation sessions, the raw data is stored upon the PDP-12 magnetic tape units and becomes accessible for various data analysis applications. Analysis programs were available on both the PDP-12 computer and Indiana University's remote computer facility. Prior to remote computing center data analysis applications, the data is transferred by telephone line into permanent disk and tape storage files which are accessed by time-sharing analysis programs.

Figure 4 diagrams the data flow process employed by CATTS at CITH. The top half of the diagram illustrates the input features of real-time and DATAMYTE data collection procedures. The bottom half diagrams the data storage, transfer and output (feedback) features.

Data-Sources for CATTS

Various observation-coding systems developed for use in teacher training research projects in reading provide data bases which are entered into the CATTS data collection system. Individual categories within systems are assigned numbers and the numbers, in turn, are entered into the computer by the observer when a specified behavior

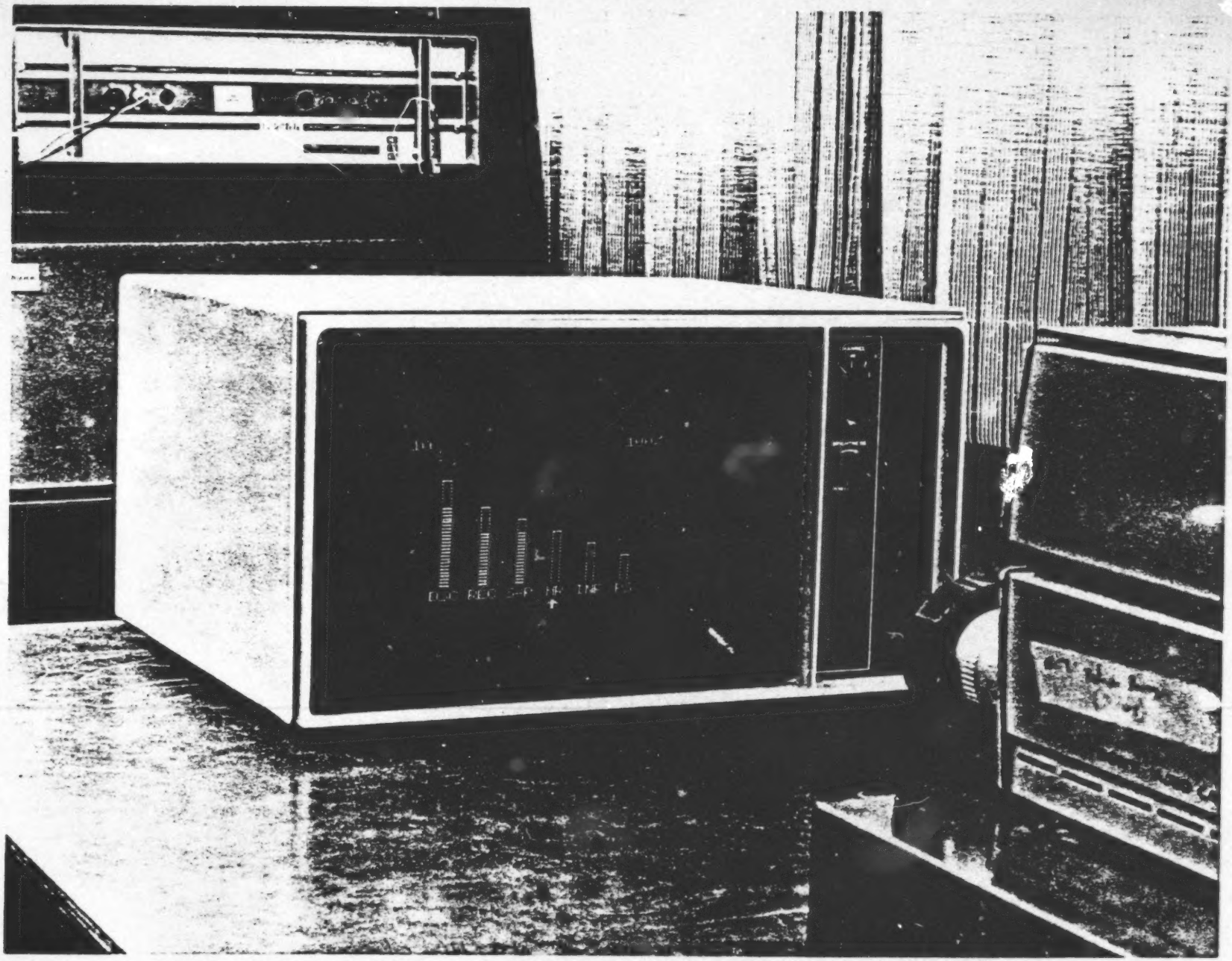

Figure 3. CRT display and closed circuit camera method of visual feedback transfer back into Teaching Station TV monitor.

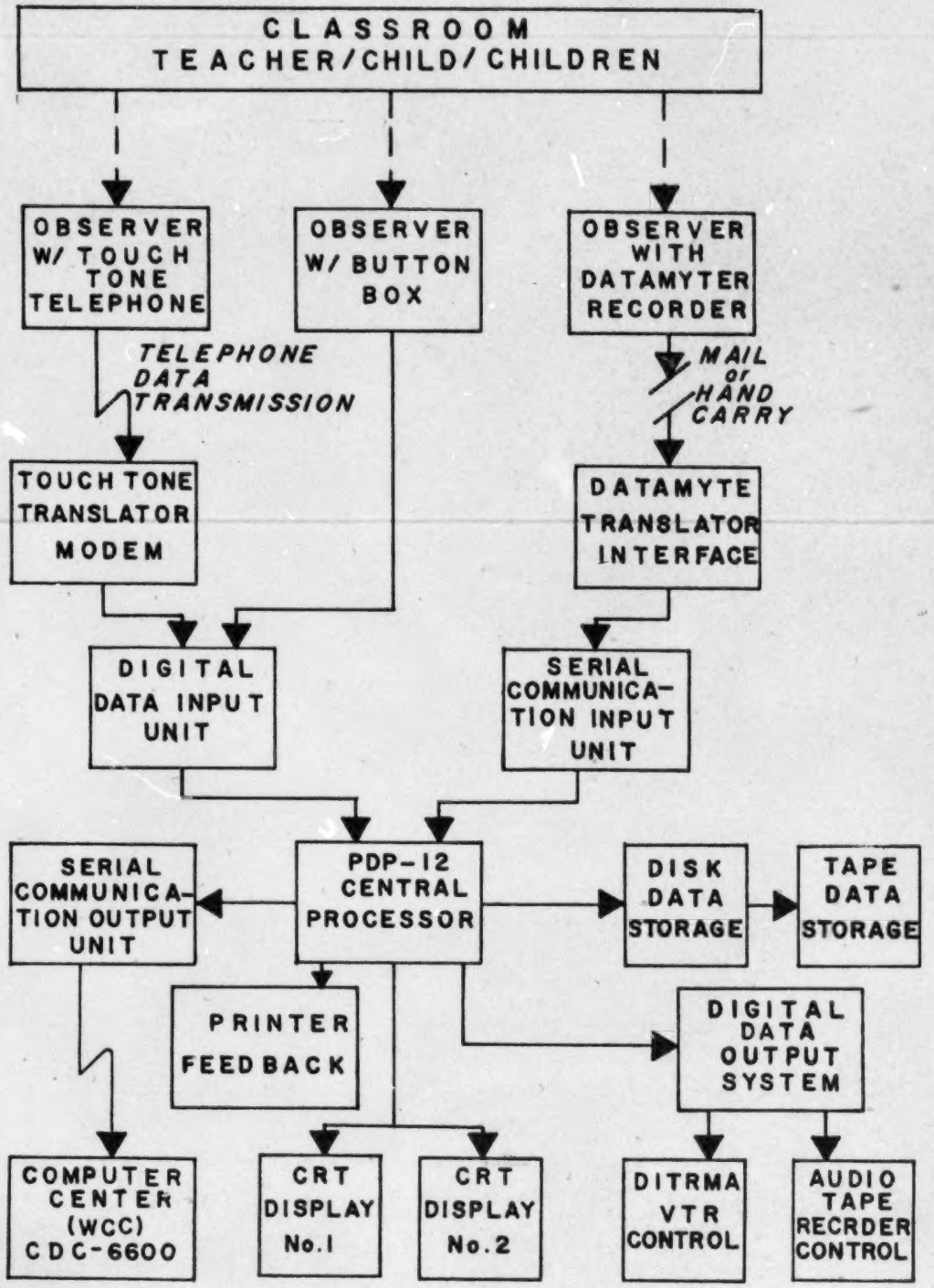

Figure 4. CATTS data flow process from data collection to feedback and analysis.

occurs during the teaching process. This numerical data is then reinterpreted back to the original category system during feedback and analysis stages.

CATTS Applications to Reading Research

The use of CATTS real-time data collection and immediate or delayed feedback innovations permit researchers to investigate many aspects of the reading process in interactive teaching situations. Immediate visual feedback provides information directly to the teacher within teaching situations and therefore aiding the teacher in an evaluation of current performance.

One application of CATTS at CITH for investigation of the reading process and teacher training preparation is to apply a reliably developed observation system to document pupil reading and listening comprehension. By empirically validating an observation measure to assist teachers and researchers to identify reading behaviors, strategies, and prompts that are related to reading comprehension, teacher and student performance may be evaluated. Through the application of training and feedback techniques, teachers may be trained to employ prompting techniques and strategies to increase pupils' oral reading performance.

The CATTS-OROS study (report in preparation) conducted at CITH during the 1975-76 school year employed CATTS to collect, feedback, and analyze a systematic observation instrument for use in evaluating oral reading behavior. Trainee competencies and performance objectives were designed from a competency-based teacher education (CBTE) frame of reference (Semmel, Semmel, & Morrissey, 1976), and CATTS was used

to evaluate selected aspects of teacher and pupil performance. CATTS feedback, both instantaneous visual TV displays and printed summaries, were used to research the effectiveness of feedback in training teacher decision-making behavior and evaluating teacher and pupil performance in the training program.

Figure 5 is an example of the form of the visual feedback transmitted back to the teacher in the classroom. The unfilled bar graphs indicate the number of specific strategies on prompts employed by a trainee to help correct pupil oral reading errors. The filled portion of the bar graphs indicate the number of times that specific prompt or strategy was successful in correcting errors. One aspect of the training program was to have trainees emphasize appropriate selected prompting skills for increased student performance (five bar graphs on the left side of the display) and de-emphasize others (two bar graphs on the right).

In addition to the instantaneous visual feedback technique, printed summaries of the training session were made available to the trainees. Figure 6a and 6b is an example of that printed feedback. This printed feedback provided the trainee with additional summary information on both pupil errors (miscues) and teacher prompts. The summary also included a sequential listing of the interactive behaviors that occurred during the session. These interactions are reported by listing the actual numerical codes of the observation system entered by the observers during the teaching session. An interaction sequence was initiated upon receipt of a pupil error (code type 2XX) and the consequent interactions that followed that error.

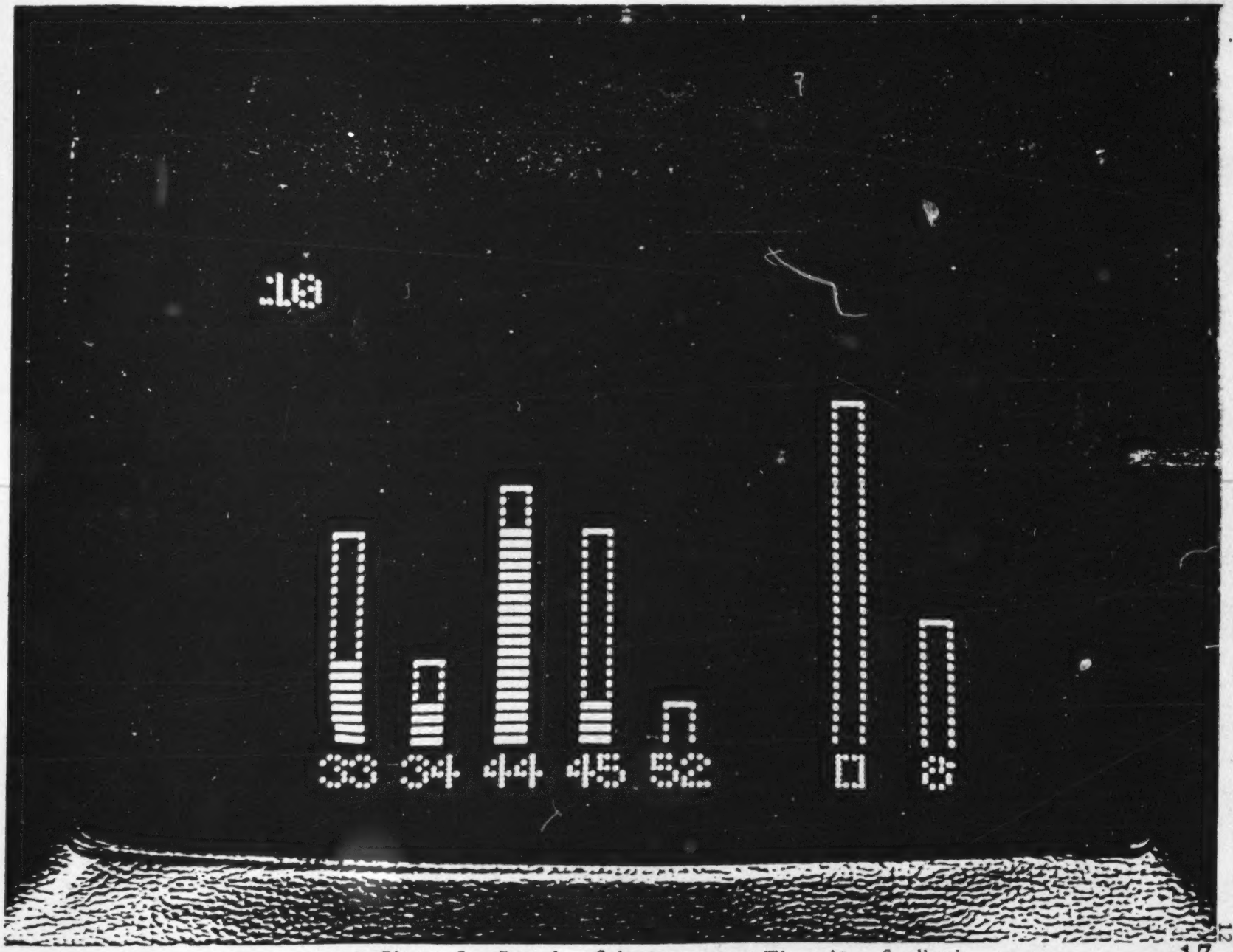

Figure 5. Example of instantaneous TV monitor feedback.

DATE: 2/16/76

NAME: THERESA REIDY

BOX NO.: 5

LESSON NO.: 8

1) TOTAL OBSERVATION TIME: 14.7 MIN.

2) TOTAL WORDS READ: 250

	MISCUES NO.	MISCUES PC.		TEACHER RESPONSES NO.	TEACHER RESPONSES PC.
3) PUPIL MISCUES TOTAL (21 + 22)	34	13	4)	12	35
5) MEANING CHANGE (21)	23	67	6)	12	52
7) NO MEANING CHANGE (22)	2	5	8)	0	0
9) SELF-CORRECTED (63)	9	26			

	PROMPTS GIVEN NO.	PROMPTS GIVEN PC.	PUPIL SUC. (62+64) NO.	PUPIL SUC. (62+64) PC.
10) TEACHER PROMPTS TOTAL (31 TO 8)	36	100	11) 22	61
12) CONTEXT (52)	11	30	13) 7	63
14) STRUCTURAL (33)	0	0	15) 0	0
16) PATTERN (44)	3	8	17) 2	66
18) PHONIC (45)	2	5	19) 1	50
20) ATTENTION (34)	0	0	21) 0	0
22) OTHER 3, 4, 5 PROMPTS	12	33		
23) POSITIVE FEEDBACK (71)	1	2		
24) NEGATIVE FEEDBACK (72)	0	0		
25) MANAGEMENT (73)	2	5		
26) TELLING (8)	5	13		
27) OTHER (9)	3	8		

SEQUENCE LENGTHS

FREQUENCY DISTRIBUTION (MINUS 15 AND 95)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
14	5	6	1	3	1	2	1	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0

MEAN= 3.53
MEDIAN= 2.30
SD= 3.47

TOTAL DATA STRINGS= 36
TOTAL CODES(- 1 AND 9)= 127

1

Figure 6a. Example of computer summary printout (Part 1).

```
900 730
213
213 630 100
213 310 640 100
212 100
212 630 100 520 640 730 100
213 630 100
213 100
211 730 640 510 620 310 640 100
222 630
212 510 610 510 610 510 640 710 100
213 520 100 520 610 510 610 510 610 450 620 610 800 640 710 100
212 800 640 100
212 520 620 100
212 310 620 730 610 440 610 440 640 610 450 610 310 640 100
212 100
222
212 800 640 520 640
215 100
213 100
213 630 100
212 630 100 520 640 100
211 620
210 100 633 520 610 640 710
212 630 100 630 520 640 710 900 730 100
213 800 640
210 520 620
212 100
213 630 520 640 710
213 520 610 310 610 510 610 440 640 710 100
224 100
213 100
213
213 100
210 100
10 800 640 900
 E
 DATA FILEEND OF DATA FILE
PROCESSED=SIONS PROCESSED=   1
```

Figure 6b. Example of computer summary printout (Part 2).

Summary analyses of project results were then performed upon the data available in mass storage files located at the Indiana University computing center. Upon completion of each observation session, the data was transmitted to the computing center by CATTS to allow for data manipulation and analysis through computer time-sharing procedures.

CATTS methodology allows flexibility to researchers in the reading process to design and implement many variations of investigation for evaluation of the interactive training process and teacher-learner performance.

Educational Significance of CATTS Technology

CATTS provides an additional tool for teacher behavior research methodology. The technical innovations of data collection and feedback techniques permit an accurate, efficient, and flexible means of investigating the sequential processes involved in reading behavior research. The primary advantage of CATTS is found in the automation of the data collection, feedback and summary aspects of conducting research using systematic observation procedures.

REFERENCES

Semmel, M. I. Project CATTS I: A computer-assisted teacher training system. In A. P. Van Treslaar (Ed.), Studies in Language and Language Behavior VII. Ann Arbor: University of Michigan, Center for Research in Language and Language Behavior, 1968.

Semmel, M. I. Toward the development of a computer-assisted teacher training system. In N. Flanders & G. Nuthall (Eds.), The Classroom Behavior of Teachers, 18, Hamburg, Germany: UNESCO Institute for Education, 1972.

Semmel, M. I. Application of systematic classroom observation to the study and modification of pupil-teacher interaction in special education. In R. Weinberg & F. H. Wood (Eds.), Observation of Pupils and Teachers in Mainstream and Special Education Settings: Alternative Strategies. Minneapolis, Minn.: Leadership Training Institute in Special Education, University of Minneapolis, 1975.

Semmel, M. I., Olson, J., & Weiske, W. M. An information and technical manual for the computer-assisted teacher training system (CATTS). Bloomington: Center for Innovation in Teaching the Handicapped, Indiana University, 1972.

Semmel, M. I., Semmel, D. S., & Morrissey, P. A. Competency-based teacher education in special education. Bloomington: Center for Innovation in Teaching the Handicapped, Indiana University, 1976.